

What is claimed is:

- 1 1. An apparatus, comprising
2 a catheter having a lumen;
3 a conductive element disposed along the catheter; and
4 a balloon having an interior in fluid communication with the lumen of the
5 catheter, the balloon being formed of a conductive material conductively coupled to the
6 conductive element, the balloon having a collapsed configuration and an expanded
7 configuration.
- 1 2. The apparatus of claim 1, wherein:
2 the balloon in the expanded configuration having a size associated with a
3 previously-formed tissue cavity.
- 1 3. The apparatus of claim 1, wherein:
2 the conductive material of the balloon includes a plurality of conductive
3 portions, two adjacent conductive portions from the plurality of conductive portions
4 being separated by an insulation portion from a plurality of insulation portions.
- 1 4. The apparatus of claim 1, wherein:
2 the conductive material is a first layer of balloon, the balloon further including a
3 second layer and a third layer, the second layer of the balloon being formed of an
4 insulation material, the third layer of the balloon being formed of a second conductive
5 material.
- 1 5. The apparatus of claim 1, wherein:
2 the conductive material is a first layer of balloon, the balloon further including a
3 second layer and a third layer, the second layer of the balloon being formed of an
4 insulation material, the third layer of the balloon being formed of a second conductive
5 material,
6 the first layer of the balloon includes a plurality of conductive portions, two
7 adjacent conductive portions from the plurality of conductive portions of the first layer
8 of the balloon being separated by an insulation portion from a plurality of insulation
9 portions,
10 the third layer of the balloon includes a plurality of conductive portions, two
11 adjacent conductive portions from the plurality of conductive portions of the third layer

- 17 -

12 of the balloon being separated by an insulation portion from a plurality of insulation
13 portions,

14 each conductive portion from the plurality of conductive portions of the first
15 layer of the balloon being offset from a corresponding conductive portion from the
16 plurality of conductive portions of the third layer of the balloon.

1 6. The apparatus of claim 1, further comprising:

2 the conductive material being a first layer of balloon, the balloon further
3 including a second layer and a third layer, the second layer of the balloon being formed
4 of an insulation material, the third layer of the balloon being formed of a second
5 conductive material,

6 the first layer and the third layer of the balloon each being a bipolar electrode.

1 7. The apparatus of claim 1, the lumen of the catheter being a first lumen, wherein:

2 the catheter has a first end portion, a second end portion and a second lumen, the
3 first end portion of the catheter being disposed within the balloon, the first end portion
4 of the catheter having an inlet associated with the first lumen and an outlet associated
5 with the second lumen,

6 a fluid regulator coupled to the second end portion of the catheter, the fluid
7 regulator configured to circulate a fluid at a temperature within the balloon less than a
8 temperature of the conductive material of the balloon.

1 8. The apparatus of claim 1, the balloon is a first balloon, the lumen of the catheter
2 being a first lumen, further comprising:

3 a second balloon disposed outside of the first balloon, the second balloon being
4 fluid permeable, the catheter including a second lumen in fluid communication with the
5 second balloon.

1 9. The apparatus of claim 1, the balloon is a first balloon, the lumen of the catheter
2 being a first lumen, further comprising:

3 a second balloon disposed outside of the first balloon, the second balloon being
4 fluid permeable, the catheter including a second lumen in fluid communication with the
5 second balloon; and

- 18 -

6 a fluid regulator coupled to the second lumen of the catheter, the fluid regulator
7 configured to control a rate of fluid per fusing from the second balloon based on an
8 impedance associated with the second balloon.

1 10. The apparatus of claim 1, further comprising:
2 an atraumatic tip disposed at a distal end of the balloon.

1 11. The apparatus of claim 1, further comprising:
2 a guide wire disposed within the lumen of the catheter and an interior of the
3 balloon.

1 12. The apparatus of claim 1, further comprising:
2 the catheter has a first non-conductive layer, a second non-conductive layer and
3 a conductive layer, the conductive layer being disposed between the first non-
4 conductive layer and the second non-conductive layer, the conductive layer being
5 electrically coupled to the conductive material of the balloon.

1 13. A method for operating a catheter having a balloon in communication with the
2 catheter, comprising:
3 percutaneously disposing the balloon into a previously-formed tissue cavity
4 while the balloon is in a collapsed configuration, the balloon being formed of a
5 conductive material;
6 expanding the balloon into an expanded configuration, the balloon in the
7 expanded configuration having a shape associated with a shape of the previously-
8 formed tissue cavity; and
9 applying a radio-frequency signal to the conductive portion of the balloon.

1 14. The method of claim 13, further comprising:
2 circulating a fluid within the balloon, the fluid within the balloon having a
3 temperature less than a temperature of the conductive material of the balloon.

1 15. The method of claim 13, the balloon being a first balloon, the catheter including
2 a second balloon disposed outside the first balloon and being fluid permeable, further
3 comprising:
4 providing a fluid within a second balloon.

1 16. The method of claim 13, the balloon being a first balloon, the catheter including
2 a second balloon disposed outside the first balloon and being fluid permeable, further
3 comprising:
4 providing a fluid within a second balloon based on an impedance associated
5 with the tissue cavity.

1 17. The method of claim 13, the applying including modifying the shape of the
2 previously-formed tissue cavity into a substantially spherical shape, the method further
3 comprising:
4 removing the balloon from the modified tissue cavity;
5 inserting a radiation therapy device into the modified tissue cavity; and
6 performing radiation therapy based on the radiation therapy device.

1 18. A apparatus for treating a margin tissue associated with a tissue cavity after
2 removal of a tissue mass, comprising:
3 a tubular member defining a lumen; and
4 a balloon having at least one electrode and defining an interior in fluid
5 communication with the lumen of the tubular member, the balloon having a range of
6 configurations including an expanded configuration corresponding to the tissue cavity
7 and a collapsed configuration.

1 19. The apparatus of claim 18, wherein:
2 the at least one electrode of the balloon is formed with the balloon.

1 20. The apparatus of claim 18, wherein:
2 the at least one electrode of the balloon includes a plurality of conductive
3 portions, two adjacent conductive portions from the plurality of conductive portions
4 being separated by an insulation portion from a plurality of insulation portions.

1 21. The apparatus of claim 18, wherein:
2 the at least one electrode is disposed within a first layer of balloon, the balloon
3 further including a second layer and a third layer, the second layer of the balloon being

- 20 -

4 formed of an insulation material, the third layer of the balloon being formed of its own
5 at least one electrode.

1 22. The apparatus of claim 21, further comprising:
2 a radio-frequency generator coupled to the at least one electrode of the first layer
3 of the balloon and the at least one electrode of the third layer of the balloon, the first
4 layer of the balloon and the third layer of the balloon defining a bipolar configuration.

1 23. A method for making an expandable ablation balloon formed of a conductive
2 material and having a first portion and a second portion, comprising:
3 masking the first portion of a balloon based on a mask;
4 depositing an insulation layer on the second portion of the balloon;
5 depositing a conductive layer on the second portion of the balloon; and
6 removing the mask from the first portion of the balloon.

1 24. The method of claim 23, the insulation layer being a first insulation layer, the
2 method further comprising:
3 depositing a second insulation layer on the second portion of balloon before the
4 removing the mask from the first portion of the balloon.

1 25. The method of claim 23, the insulation layer being a first insulation layer, the
2 method further comprising:
3 depositing a second insulation layer on the first portion of the balloon and the
4 second portion of the balloon after the removing the mask from the first portion of the
5 balloon.